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| 10/772,595 | 02/05/2004 | George Bokisa | TASKP104US | 5184 |
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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|------------------------------|--------------------------------------|--------------------------------------|--|
| Office Action Summary | Application No. 10/772,595 | Applicant(s) BOKISA ET AL. | |
| | Examiner Edna Wong | Art Unit 1795 | |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 13 November 2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-13 and 15-26 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-13 and 15-26 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114 was filed in this application after a decision by the Board of Patent Appeals and Interferences, but before the filing of a Notice of Appeal to the Court of Appeals for the Federal Circuit or the commencement of a civil action. Since this application is eligible for continued examination under 37 CFR 1.114 and the fee set forth in 37 CFR 1.17(e) has been timely paid, the appeal has been withdrawn pursuant to 37 CFR 1.114 and prosecution in this application has been reopened pursuant to 37 CFR 1.114. Applicant's submission filed on November 13, 2007 has been entered.

This is in response to the Amendment dated November 13, 2007. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office Action.

Response to Arguments

Claim Rejections - 35 USC § 103

I. Claims **1-6, 8 and 24** have been rejected under 35 U.S.C. 103(a) as being unpatentable over **JP 10-245693** ('693) in combination with **Passal** (US Patent No. 3,697,391).

The rejection of claims 1-6, 8 and 24 under 35 U.S.C. 103(a) as being unpatentable over JP 10-245693 ('693) in combination with Passal has been withdrawn

in view of Applicants' amendment.

II. Claim 7 have been rejected under 35 U.S.C. 103(a) as being unpatentable **JP 10-245693** ('693) in combination with **Passal** (US Patent No. 3,697,391) as applied to claims 1-6, 8 and 24 above, and further in view of **Hui** (US Patent No. 6,372,118 B2).

The rejection of claim 7 under 35 U.S.C. 103(a) as being unpatentable JP 10-245693 ('693) in combination with Passal as applied to claims 1-6, 8 and 24 above, and further in view of Hui has been withdrawn in view of Applicants' amendment.

III. Claims **9-12, 15-17 and 25** have been rejected under 35 U.S.C. 103(a) as being unpatentable over **JP 10-245693** ('693) in combination with **Passal** (US Patent No. 3,697,391).

The rejection of claims 9-12, 15-17 and 25 under 35 U.S.C. 103(a) as being unpatentable over JP 10-245693 ('693) in combination with Passal has been withdrawn in view of Applicants' amendment.

IV. Claim **13** has been rejected under 35 U.S.C. 103(a) as being unpatentable over **JP 10-245693** ('693) in combination with **Passal** (US Patent No. 3,697,391) as applied to claims 9-12, 15-17 and 25 above, and further in view of **SU 1544847** ('847).

The rejection of claim 12 under 35 U.S.C. 103(a) as being unpatentable over JP 10-245693 ('693) in combination with Passal as applied to claims 9-12, 15-17 and 25

above, and further in view of SU 1544847 ('847) has been withdrawn in view of Applicants' amendment.

V. Claims **18-23 and 26** have been rejected under 35 U.S.C. 103(a) as being unpatentable over **JP 10-245693** ('693) in combination with **Passal** (US Patent No. 3,697,391).

The rejection of claims 18-23 and 26 under 35 U.S.C. 103(a) as being unpatentable over JP 10-245693 ('693) in combination with Passal has been withdrawn in view of Applicants' amendment.

Response to Amendment

Claim Objections

Claims **8 and 15** are objected to because of the following informalities:

Claim 8

line 3, the word -- is -- should be inserted after the word "compound".

Claim 15

line 2, the word "slected" should be amended to the word -- selected --.

Appropriate correction is required.

Claim Rejections - 35 USC § 112

I. Claims 9-13, 15-17 and 25 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

Claim 9

lines 5-6, recite "about 0.05 g/l or more and about 10 g/l or less of an amine-boron compound".

Applicants' specification, pages 1-24, does not disclose about 0.05 g/l or more and about 10 g/l or less of an amine-boron compound. Thus, there is insufficient written description to inform a skilled artisan that applicant was in possession of the claimed invention as a whole at the time the application was filed.

However, there is sufficient written description for about 0.01 g/l or more and about 20 g/l or less of each of at least two ionic alloy metals as disclosed on page 8, lines 6-7.

The Examiner has carefully considered the entire specification as originally filed, however, there is found no literal support in the specification for the newly added limitation in amended claim 9. Applicants have not provided the page number and line numbers from the specification as to where the newly added limitations are coming from. *Ex parte Grasselli*, 231 USPQ 393 (Bd. App. 1983) *aff'd mem.* 738 F.2d 453

(Fed. Cir. 1984).

Claim 9

lines 5-6, recite "about 0.05 g/l or more and about 10 g/l or less of an amine-**boron** compound".

Applicants' specification, pages 1-24, does not disclose an amine-boron compound.

Thus, there is insufficient written description to inform a skilled artisan that applicant was in possession of the claimed invention as a whole at the time the application was filed.

However, there is sufficient written description for an amine-**borane**:

Specific examples of boron salts and boron containing compounds include boron nitride, boron trichloride, boron trifluoride, boron triiodide, boron tribromide, boron oxide, boron phosphate, dimethylamine borane, morpholine borane, dimethylamino borane, dimethylsulfide borane, t-butylamine borane, ammonia borane, N,N-diethylaniline borane, diphenylphosphine borane, dimethylaminopyridine borane, ethylmorpholine borane, methylmorpholine borane, 2,6-lutidine borane, morpholine borane, oxathiane borane, phenylmorpholine borane, pyridine borane, tetrahydrofuran borane, tributylphosphine borane, triethylamin borane, trimethylamine borane, borax, and hydrates thereof. Boron may alternatively be introduced into the electroplating bath by a boron containing acid, an amino-borane compound, and/or an amine-borane compound (collectively referred to as boron containing compounds) [page 6, line 25 to page 7, line 7].

Furthermore, boron is B, while a borane is B_xH_y.

The Examiner has carefully considered the entire specification as originally filed, however, there is found no literal support in the specification for the newly added

limitation in amended claim 9. Applicants have not provided the page number and line numbers from the specification as to where the newly added limitations are coming from. *Ex parte Grasselli*, 231 USPQ 393 (Bd. App. 1983) *aff'd mem.* 738 F.2d 453 (Fed. Cir. 1984).

II. Claims **1-13 and 15-26** are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 1

lines 6-7, "the quaternary alloy comprising nickel, cobalt, boron, and at least one metal" lacks antecedent basis.

Claim 6

line 4, it appears that the "boron" is the same as the amine-borane compound recited in claim 1, line 4. However, it is unclear if it is. If it is not, then why are there two boron sources in the electroplating bath if the amine-borane is the boron source for the boron recited in claim 1, line 7,

lines 5-6, it appears that the "at least one brightener" is the same as the at least one acetylenic brightener. However, it is unclear if it is.

Claim 9

lines 9-10, "the alloy comprising nickel, cobalt, boron, and at least one alloy metal" lacks antecedent basis. See also claim 9, lines 1-2, which recites "forming an alloy comprising nickel, cobalt and at least one alloy metal". The alloy formed is not the same between what's recited in the preamble and in the body of the claim.

Claim 18

line 8, the "at least one alloy metals" lack antecedent basis. See claim 18, line 2.

Claim Rejections - 35 USC § 103

I. Claims **1-8 and 24** are rejected under 35 U.S.C. 103(a) as being unpatentable over **JP 9-41183** ('183) in combination with **GB 1,435,267** ('267).

JP '183 teaches a method of electroplating a quaternary alloy comprising nickel and cobalt (= cobalt-nickel-iron-boron alloy) [page 2, [0007]], comprising:

(a) providing an electroplating bath (= electroplating in an acidic bath) [page 2, [0007]] comprising:

- (i) an anode **3** (page 3, [0015]);
- (ii) a cathode **2** (page 3, [0015]);
- (iii) water (= from hydrates);
- (iv) ionic nickel (= from nickel sulfate: $\text{NiSO}_4 \cdot 6\text{H}_2\text{O}$);
- (v) ionic cobalt (= from cobalt sulfate: $\text{CoSO}_4 \cdot 7\text{H}_2\text{O}$);

(vi) an amine-borane compound (= a trimethylamine borane or dimethylamine borane); and

(v) at least one ionic alloy metals (= from iron sulfate: $\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$) [page 3, [0017]]; and

(b) applying a current (= from electroplating) to the electroplating bath whereby the quaternary alloy comprising nickel, cobalt, boron and at least one alloy metal forms on the cathode (= the Co-Ni-Fe-B alloy electroplating thin film) [page 2, [0007]].

The at least one ionic alloy metal comprises at least one metal selected from the group consisting of aluminum, antimony, bismuth, copper, gallium, germanium, gold, indium, iridium, iron, lead, manganese, molybdenum, niobium, osmium, rhodium, ruthenium, scandium, silver, palladium, platinum, tantalum, thallium, tin, titanium, tungsten, vanadium, yttrium, zirconium, and zinc in ionic form (= iron from iron sulfate: $\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$) [page 3, [0017]].

The electroplating bath has a pH from about 2 to about 6 (= pH 2-4) [abstract; and page 2, [0013]] and a temperature from about 10°C to about 90°C (= 35 ± 0.1 °C) [col. 4, line 6; and page 3, [0017]].

The quaternary alloy comprises about 2% by weight or less of components other than nickel, cobalt, boron (= from 0.01 mol/l of $\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$) and the amine-borane compound is selected from the group consisting of dimethylamine borane, t-butylamine borane, and hydrates thereof (= dimethylamine borane) [page 3, [0017]].

The method of JP '183 differs from the instant invention because JP '183 does not disclose the following:

a. Wherein the electroplating bath comprises at least one acetylenic brightener, as recited in claim 1.

JP '183 teaches a Co-Ni-Fe-B alloy electroplating bath comprising:

0.55 mol/l of $\text{CoSO}_4 \cdot 7\text{H}_2\text{O}$;
0.115 mol/l of $\text{NiSO}_4 \cdot 6\text{H}_2\text{O}$;
0.01 mol/l of $\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$;
0.05-2.0 g/l of dimethylamine borane and/or trimethylamine borane;
0.1 g/l of sodium dodecyl sulfate; and
1.5 g/l saccharin sodium (page 3, [0017]).

Like JP '183, GB '267 teaches a Co-Ni-Fe alloy electroplating bath comprising:

200-400 g/l of $\text{NiSO}_4 \cdot 7\text{H}_2\text{O}$;
15-225 g/l of $\text{CoSO}_4 \cdot 7\text{H}_2\text{O}$;
15-75 g/l $\text{NiCl}_2 \cdot 6\text{H}_2\text{O}$;
37-50 g/l H_3BO_3 ; and
5-80 g/l of $\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$ (page 6, line 18 to page 7, line 23).

GB '267 teaches that for bright, well-leveled alloy plating, primary brighteners such as diethoxylated 2-butyne-1,4-diol or dipropoxylated 2-butyne-1,4-diol may be used in cooperation with a sulpho-oxygen secondary brightener, preferably saccharin, a secondary auxiliary brightener and an anti-pitting agent (page 3, lines 15-18).

The primary brightener includes plating additive compounds such as reaction products of epoxides with *alpha*-hydroxy acetylenic alcohols such as diethoxylated 2-butyne-1,4-diol or dipropoxylated 2-butyne-1,4-diol, other acetylenics, N-heterocyclics, active sulfur compounds and dye-stuffs. Specific examples of such plating additives are:

1,4-di-(β -hydroxyethoxy)-2-butyne

2,4,6-trimethyl N-propargyl pyridinium bromide

2-butyne-1,4-diol

propargyl alcohol

2-methyl-3-butyn-2-ol (page 3, lines 36-57).

Such plating additives compounds, which may be used singly or in suitable combinations, have one of more of the following functions:

(1) To obtain semi-lustrous deposits or to produce substantial grain-refinement over the usual dull, matter, grainy, non-reflective deposits from additive free baths.

(2) To act as ductilizing agents when used in combination with other additives such as primary brighteners.

(3) To control internal stress of deposits, generally by making the stress desirably compressive.

(4) To introduce controlled sulfur contents into the electrodeposits to desirably affect chemical reactivity, potential differences in composite coating systems, etc. thereby decreasing corrosion, better protecting the basis metal

from corrosion, etc. (page 4, lines 15-27).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the electroplating bath described by JP '183 with wherein the electroplating bath comprises at least one acetylenic brightener because acetylenic brighteners are known as primary brighteners in similar Co-Ni-Fe alloy electroplating baths and would have been used for bright, well-leveled alloy plating, as taught by GB '267 (page 3, lines 11-57).

b. Wherein the acetylenic brightener is selected from the group consisting of acetylenic alcohols, acetylenic amines, acetylenic esters, acetylenic sulfonic acids and sulfonates, alkoxylated acetylenic alcohols, and acetylenic carboxylic acids, as recited in claim 3.

c. Wherein the acetylenic brightener is selected from the group consisting of ethoxylated butynediol; 2-butyne-1,4-diol; propargyl alcohol; ethoxylated propargyl alcohol; hydroxyethyl propynyl ether; beta-hydroxypropyl, propynyl ether; gamma-propynyloxy, bis-beta-hydroxyethyl ether 2-butyne-1,4-diol; bis-beta-hydroxypropyl ether 2-butyne-1,4-diol; 1,4-di-(beta-hydroxyethoxy)-2-butyne; 1,4-di-(beta-hydroxy-gamma-chloropropoxy)-2-butyne; 1,4-di-(beta-gamma-epoxypropoxy)-2-butyne; 1,4-di-(beta-hydroxy-gamma-butenoxy)-2-butyne; 1,4-di-(2'-hydroxy-4'-oxa-6'-heptenoxy)-2-butyne; 2,4,6-trimethyl N-propargyl pyridinium bromide; 2-methyl-3-butyne-2-ol; 1-(beta-hydroxyethoxy)-2-propyne; and 1-(beta-hydroxypropoxy)-2-propyne, as recited in claim

24.

GB '267 teaches wherein the acetylenic brightener is selected from the group consisting of acetylenic alcohols, acetylenic amines, acetylenic esters, acetylenic sulfonic acids and sulfonates, alkoxyated acetylenic alcohols, and acetylenic carboxylic acids; and wherein the acetylenic brightener is selected from the group consisting of ethoxylated butynediol; **2-butyne-1,4-diol**; **propargyl alcohol**; ethoxylated propargyl alcohol; hydroxyethyl propynyl ether; beta-hydroxypropyl, propynyl ether; gamma-propynyloxy, bis-beta-hydroxyethyl ether 2-butyne-1,4-diol; bis-beta-hydroxypropyl ether 2-butyne-1,4-diol; **1,4-di-(beta-hydroxyethoxy)-2-butyne**; 1,4-di-(beta-hydroxy-gamma-chloropropoxy)-2-butyne; 1,4-di-(beta-gamma-epoxypropoxy)-2-butyne; 1,4-di-(beta-hydroxy-gamma-butenoxy)-2-butyne; 1,4-di-(2'-hydroxy-4'-oxa-6'-heptenoxo)-2-butyne; **2,4,6-trimethyl N-propargyl pyridinium bromide**; **2-methyl-3-butyne-2-ol**; 1-(beta-hydroxyethoxy)-2-propyne; and 1-(beta-hydroxypropoxy)-2-propyne (page 3, lines 36-57).

d. Wherein the electroplating bath further comprises at least one sulfur containing brighteners selected from the group consisting of sulfinic acids, sulfonic acids, aromatic sulfonates, aromatic sulfinates, sulfonamides, sulfonimides, sulfimides, and sulfo-betaines, as recited in claim 4.

GB '267 teaches that for bright, well-leveled alloy plating, primary brighteners such as diethoxylated 2-butyne-1,4-diol or dipropoxylated 2-butyne-1,4-diol may be

used in cooperation with a sulpho-oxygen secondary brightener, preferably saccharin, a secondary auxiliary brightener and an anti-pitting agent (page 3, lines 15-18). The primary brightener include plating additive compounds such as reaction products of epoxides with *alpha*-hydroxy acetylenic alcohols such as diethoxylated 2-butyne-1,4-diol or dipropoxylated 2-butyne-1,4-diol, other acetylenics, N-heterocyclics, active sulfur compounds and dye-stuffs (page 3, lines 15-18).

The secondary brighteners include aromatic sulfonates, sulfonamides, sulfonimides and sulfinates. Specific examples of such plating additives are:

saccharin

trisodium 1,3,6-naphthalene trisulfonate

sodium benzene monosulfonate

dibenzene sulfonimide

sodium benzene monosulfinate (page 4, lines 7-14).

Such plating additives compounds, which may be used singly or in suitable combinations, have one of more of the following functions:

(1) To obtain semi-lustrous deposits or to produce substantial grain-refinement over the usual dull, matter, grainy, non-reflective deposits from additive free baths.

(2) To act as ductilizing agents when used in combination with other additives such as primary brighteners.

(3) To control internal stress of deposits, generally by making the stress

desirably compressive.

(4) To introduce controlled sulfur contents into the electrodeposits to desirably affect chemical reactivity, potential differences in composite coating systems, etc. thereby decreasing corrosion, better protecting the basis metal from corrosion, etc. (page 4, lines 15-27).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the electroplating bath described by JP '183 with the electroplating bath further comprises at least one sulfur containing brighteners selected from the group consisting of sulfinic acids, sulfonic acids, aromatic sulfonates, aromatic sulfinates, sulfonamides, sulfonimides, sulfimides, and sulfo-betaines because primary brighteners used in cooperation with a sulpho-oxygen secondary brightener would have been used for bright, well-leveled alloy plating, as taught by GB '267 (page 3, lines 11-57; and page 4, lines 1-6 and 15-27).

e. Wherein a current density of about 1 ASF or more and about 500 ASF or less is applied to the electroplating bath, as recited in claim 5.

The electroplating disclosed by JP '183 inherently has a current density.

GB '267 teaches a cell current of 2 amperes (page 7, line 41: Comparative Examples 1-5) and 5 amperes (page 8, line 33: Example 6).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the electroplating bath described by JP '183 with

wherein a current density of about 1 ASF or more and about 500 ASF or less is applied to the electroplating bath because the current density is a result-effective variable and one skilled in the art has the skill to calculate the current density that would have determined the success of the desired reaction to occur, absent evidence to the contrary (MPEP § 2141.03 and § 2144.05(II)(B)).

It is held that changes in the current density is not a patentable modification; however, such changes may impart patentability to a process if the ranges claimed produce new and unexpected results which are different in kind and not merely in degree from results of the prior art, such ranges are termed "critical" ranges and Applicant has the burden of proving such criticality; even though Applicant's modification results in great improvement and utility over the prior art, it may still not be patentable if the modification was within capabilities of one skilled in the art; more particularly, where general conditions of the claim are disclosed in the prior art, it is not inventive to discover optimum or workable ranges by routine experimentation (MPEP § 2141.03 and § 2144.05(II)(B)).

f. Wherein the electroplating bath comprises about 10 g/l or more and about 150 g/l or less of ionic nickel, about 0.5 g/l or more and about 70 g/l or less of ionic cobalt, about 0.01 g/l or more and about 20 g/l or less of boron, about 0.01 g/l or more and about 20 g/l or less of the ionic alloy metal, and from about 0.001% to about 5 % by weight of at least one brightener, as recited in claim 6.

JP '183 teaches a Co-Ni-Fe-B alloy electroplating bath comprising:

0.55 mol/l (= 154.61 g/l) of $\text{CoSO}_4 \cdot 7\text{H}_2\text{O}$

√ 0.115 mol/l (= **30.23 g/l**) of $\text{NiSO}_4 \cdot 6\text{H}_2\text{O}$

√ 0.01 mol/l (= **2.78 g/l**) of $\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$ (page 3, [0017]).

√ **0.05-2.0 g/l** of dimethylamine borane and/or trimethylamine

borane

0.1 g/l of sodium dodecyl sulfate

√ **1.5 g/l** saccharin sodium (= a secondary brightener, see GB '267, page 4, lines 7-10) [page 3, [0017]].

JP '183 teaches 0.55 mol/l (= 154.61 g/l) of $\text{CoSO}_4 \cdot 7\text{H}_2\text{O}$.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the electroplating bath described by JP '183 with about 0.5 g/l or more and about 70 g/l or less or ionic cobalt because the concentration of cobalt is a result-effective variable and one skilled in the art has the skill to calculate the concentration of cobalt that would have determined the success of the desired reaction to occur, absent evidence to the contrary (MPEP § 2141.03 and § 2144.05(II)(B)).

It is held that changes in the concentration of cobalt is not a patentable modification; however, such changes may impart patentability to a process if the ranges claimed produce new and unexpected results which are different in kind and not merely in degree from results of the prior art, such ranges are termed "critical" ranges and

Applicant has the burden of proving such criticality; even though Applicant's modification results in great improvement and utility over the prior art, it may still not be patentable if the modification was within capabilities of one skilled in the art; more particularly, where general conditions of the claim are disclosed in the prior art, it is not inventive to discover optimum or workable ranges by routine experimentation (MPEP § 2141.03 and § 2144.05(II)(B)).

g. Wherein the anode comprises at least one of nickel, cobalt, at least one alloy metal, iridium oxide, platinum, titanium, graphite, carbon, and platinum-titanium, as recited in claim 7.

JP '183 teaches an anode 3 (page 3, [0015]).

GB '267 teaches that anodes used in the baths may consist of the particular single metals being plated such as iron and nickel for plating nickel-iron; or nickel, cobalt, and iron for plating nickel-cobalt-iron (page 7, lines 5-7).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the anode described by JP '183 with wherein the anode comprises at least one of nickel, cobalt, at least one alloy metal, iridium oxide, platinum, titanium, graphite, carbon, and platinum-titanium because anodes used in the baths may consist of the particular single metals being plated. Anodes consisting of nickel, cobalt, and iron would have been used for plating nickel-cobalt-iron as taught by GB '267 (page 7, lines 5-7).

II. Claims **9-12, 15-17 and 25** are rejected under 35 U.S.C. 103(a) as being unpatentable over **JP 9-41183** ('183) in combination with **GB 1,435,267** ('267).

JP '183 and GB '267 are as applied for reasons as discussed above and incorporated here.

JP '183 also teaches wherein the at least one ionic alloy metal comprises iron in ionic form (= from iron sulfate: $\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$) [page 3, [0017]].

The method of JP '183 differs from the instant invention because JP '183 does not disclose the following:

a. Providing an electroplating bath comprising an anode, a cathode, water, about 40 g/l or more and about 100 g/l or less of ionic nickel, about 1 g/l or more and about 30 g/l or less of ionic cobalt, about 0.05 g/l or more and about 10 g/l or less of an amine-boron compound, and about 0.05 g/l or more and about 10 g/l or less of each of at least one ionic alloy metal, and from about 0.005 % to about 2.5 % by weight of at least one acetylenic brightener.

JP '183 teaches providing an electroplating bath (= electroplating in an acidic bath) [page 2, [0007]] comprising:

√ an anode **3** (page 3, [0015]);

√ a cathode **2** (page 3, [0015]);

√ water (= from hydrates);

0.55 mol/l (= 154.61 g/l) of $\text{CoSO}_4 \cdot 7\text{H}_2\text{O}$

√ 0.115 mol/l (= **30.23 g/l**) of $\text{NiSO}_4 \cdot 6\text{H}_2\text{O}$

√ 0.01 mol/l (= **2.78 g/l**) of $\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$ (page 3, [0017]).

√ **0.05-2.0 g/l** of dimethylamine borane and/or trimethylamine

borane

0.1 g/l of sodium dodecyl sulfate

1.5 g/l saccharin sodium (page 3, [0017]).

JP '183 teaches 0.55 mol/l (= 154.61 g/l) of $\text{CoSO}_4 \cdot 7\text{H}_2\text{O}$.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the electroplating bath described by JP '183 with about 1 g/l or more and about 30 g/l or less of ionic cobalt because the concentration of cobalt is a result-effective variable and one skilled in the art has the skill to calculate the concentration of cobalt that would have determined the success of the desired reaction to occur, absent evidence to the contrary (MPEP § 2141.03 and § 2144.05(II)(B)).

It is held that changes in the concentration of cobalt is not a patentable modification; however, such changes may impart patentability to a process if the ranges claimed produce new and unexpected results which are different in kind and not merely in degree from results of the prior art, such ranges are termed "critical" ranges and Applicant has the burden of proving such criticality; even though Applicant's modification results in great improvement and utility over the prior art, it may still not be patentable if the modification was within capabilities of one skilled in the art; more particularly, where general conditions of the claim are disclosed in the prior art, it is not

inventive to discover optimum or workable ranges by routine experimentation (MPEP § 2141.03 and § 2144.05(II)(B)).

As to about 0.005% to about 2.5% by weight of at least one acetylenic brightener, GB '267 teaches that typical nickel-cobalt-iron-containing bath compositions which may be used in combination with effective amounts of about 0.005-0.2 g/l (= 0.0005% to 0.02%) of a primary brightener (page 5, lines 17-24).

b. Wherein the electroplating bath further comprises at least one organic brightener selected from the group consisting of ethylenic alcohols, coumarins, aldehydes, compounds containing a C≡N linkage, and heterocyclics, as recited in claim 15.

GB '267 teaches thiodipropionitrile as a primary brightener (page 3, lines 53).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the electroplating bath described by JP '183 with wherein the electroplating bath further comprises at least one organic brightener selected from the group consisting of ethylenic alcohols, coumarins, aldehydes, compounds containing a C≡N linkage, and heterocyclics because it is *prima facie* obvious to combine two compositions each of which is taught by the prior art to be useful for the same purpose, in order to form a third composition to be used for the very same purpose. The idea of combining them flows logically from their having been individually taught in the prior art (MPEP § 2144.06 and § 2144.07).

III. Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over **9-41183** ('183) in combination with **GB 1,435,267** ('267) as applied to claims 9-12, 15-17 and 25 above, and further in view of **SU 1544847** ('847).

JP '183 and GB '267 are as applied as discussed above and incorporated herein.

The method of JP '183 differs from the instant invention because JP '183 does not disclose wherein the electroplating bath further comprises a sulfo-betaine brightener, as recited in claim 13.

SU '847 teaches that adding a betaine of 2-(4-pyridyl)ethanesulfonic acid to an acidic nickel or nickel-cobalt alloy electrolyte increases the hardness of their coatings (abstract).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the method of JP '183 with wherein the electroplating bath further comprises a sulfo-betaine brightener because this would have increased the hardness of nickel-cobalt alloy coatings as taught by SU '847 (abstract).

Since there are minimal amounts of the at least one ionic alloy metal in the electroplating bath and the electrodeposited coating, it appears that there would have been a reasonable expectation of success to modify the electroplating bath of JP '183 by adding a sulfo-betaine brightener (MPEP § 2143.02).

IV. Claims **18-23 and 26** are rejected under 35 U.S.C. 103(a) as being unpatentable

over **JP 9-41183** ('183) in combination with **GB 1,435,267** ('267).

JP '183 and GB '267 are as applied for reasons as discussed above and incorporated here.

The method of JP '183 differs from the instant invention because JP '183 does not disclose the following:

- a. Wherein the electroplating bath further comprises at least one conductivity salt, as recited in claim 22.
- b. Wherein the conductivity salt is selected from the group consisting of boric acid, sodium sulfate, sodium chloride, potassium sulfate, and potassium chloride, as recited in claim 23.

GB '267 teaches 37-50 g/l H_3BO_3 (page 6, Table V). GB '267 teaches supplying borate anions, added as boric acid for buffering and other purposes (page 3, lines 5-6).

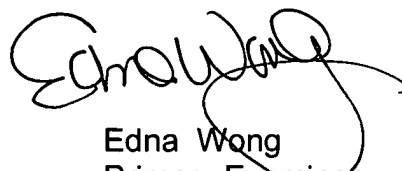
It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the electroplating bath of JP '183 with wherein the electroplating bath further comprises at least one conductivity salt; and wherein the conductivity salt is selected from the group consisting of boric acid, sodium sulfate, sodium chloride, potassium sulfate, and potassium chloride because borate anions, added as boric acid, would have been supplied for buffering and other purposes as taught by GB '267 (page 3, lines 5-6).

Any inquiry concerning this communication or earlier communications from the

examiner should be directed to Edna Wong whose telephone number is (571) 272-1349. The examiner can normally be reached on Mon-Fri 7:30 am to 4:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam Nguyen can be reached on (571) 272-1342. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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